

Internet-Based Standardized Patient Simulation With Automated Feedback

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Background. There exist many modalities for teaching and testing medical students. One method being explored is computer-based patient simulation.¹ Traditionally, exposure to a variety of patients has been achieved through years of training under the supervision of experts in the field. Computerized patient simulation has been proposed as a method of creating a standardized patient care experience through algorithms and predefined patient findings. One study reported that after experience with computer-based simulation, 80% of students and mentors felt that it should be a mandatory part of medical education.² Access to effective simulations with high-yield cases can be costly. Internet-based tools enjoy easy distribution and centralized maintenance. Simulations distributed via the Internet have proven successful in selected medical fields.³ Automated scoring of patient interactions has also been proposed as a way to eliminate the effort required for mentor evaluation.⁴

We present a novel approach to patient simulation through the combined aspects of an effective delivery method, student management, and a computer-assisted feedback mechanism.

Methods. Development of a free Internet-based patient simulator was conducted in a series of steps. First, mentor expertise was obtained to formulate guidelines and proper methodology for obtaining a patient history, performing a physical exam, and ordering tests. This provided an initial set of queries that an expert could make regarding a patient. The ability to chart one's interaction was included, as well as the ability to maintain a list of differential diagnoses.

After the tool had proven successful in patient presentation using an expert trained to use the software, it was modified based on expert and learner feedback. Additional features were added including tracking, with learner and mentor feedback mechanisms.

Results. A browser-based user interface was created to allow the learner to replicate the experts' methodology of obtaining the necessary data to develop a differential diagnosis. Clinical questions were grouped into the categories of history, physical examination, laboratory, radiology and consultation to allow the user to recognize the clinical questions that need to be considered. This list is comprehensive

and remains constant among all simulated patients. Also, a data structure was designed to manage the differential diagnosis list and multimedia elements. The simulation software has been used in this manner successfully by mentors in demonstrations during weekly small groups sessions over the past two years.

The web-based interface was augmented to allow for case creation by multiple users. A student management system was developed so that mentors could create a list of simulated cases to visit and hide cases that could be released at a later point in time for specific student groups. A tracking tool was also created to follow the user's course of action as well as an interface for the mentor to view and assess student-patient encounters. A rough assessment of the user's ability to ask pertinent questions is assessed by rating them against those deemed important to the expert who created the case. Current feedback includes how sensitive and specific the student queries were to the expert case creator's definition. The original site is available at <http://umed.med.utah.edu/pediatrics> and the second version is available at <http://umed.med.utah.edu/cliniconline/>.

Future improvements will be designed to determine a system for rating learners against experts and to establish the simulation as desirable to learners, independent of mentor evaluation.

References

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